that the operation is most successful in November and December, and that if delayed until January the results are not so serviceable, as flowering plants can then be obtained in the ordinary way.

It is surmised that the anæsthetics act by causing the removal of the water from the protoplasm, thus drying it up to a certain extent and causing a suspension of its activity. Dr. Johannsen's observations are summarised in a *brochure* published in French by M. Maumené, and entitled "Nouvelle méthode de culture forçée des arbustes et des plantes soumis à l'action de l'éther et du chloroforme," Paris 1903. Abstracts from these publications have been given in various Continental and English horticultural journals, particularly in the October part of the *Journal* of the Royal Horticultural Society, which contains a paper on the subject by M. E. Lemoine, of Nancy, to which reference may be made for fuller details.

M. O. CALLANDREAU.

It is but a short time since one read in the *Bulletin Astronomique* the words of generous appreciation and sympathy with which M. Callandreau committed to the grave the remains of his friend and colleague M. Prosper Henry. There was no suspicion then that in a very short time his own funeral oration would have to be spoken, or that the staff of the Paris Observatory was so soon to suffer another almost irreparable loss by the removal of another zealous officer equally renowned, equally devoted to the interests of the observatory, but adding to its reputation in a very different direction.

For many years attached to the service of the observatory, M. Callandreau took part in the routine observations, more especially confining himself to the extra-meridional work. Small planets, comets, double stars, each in turn came under his notice, but though a skilful and painstaking observer, he will not be remembered for his diligence in this direction.

Trained in a school directed by profound mathematicians, in which, perhaps, the influence of Gylden can be recognised, and gifted with an unusual analytical skill, he attacked nearly all the questions of celestial mechanics, and everywhere left traces of his powerful and inventive mind. His acquaintance with all the resources of analysis as applied to the practical needs of astronomy enabled him not only to improve the methods employed in some of the more recondite applications of mathematics to astronomical problems, but induced him to open up new paths of inquiry, which are likely to exercise no inconsiderable influence on many questions of abiding interest and prime importance. It will be sufficient here to refer to his method of treatment of definite integrals which occur in the calculations of planetary perturbation, to the consideration he gave to the troublesome question of perturbations of small planets in which the mean motion is nearly commensurable with that of Jupiter, to his occasional references to the theory of the moon, to the figures of the planets, to problems in geodesy, to show how wide an outlook he possessed over the necessities and the difficulties of mathematical astronomy. It is perhaps in some measure to be regretted that his attention wandered over a variety of inquiries, for if everywhere he illuminated the subject under discussion, greater concentration in a particular subject might have added to his reputation and left a deeper mark on the history of his time. Perhaps his "Contributions to the Theory of Cometary Capture" comes nearest to a complete treatise, and his services in this department of astronomy will be long remembered. Some of his papers bear marks of being suggested by his professorial work in connection with the École Polytechnique, where he occupied the chair of astronomy. His life was a busy one, divided between his duties at the observatory and his professorial engagements, while his kindness of disposition induced him to give willing assistance to those who applied to him. The writer of these few lines gratefully acknowledges more than one kindness he has received at the hands of this distinguished mathematician and astronomer.

Member of the Paris Academy of Sciences and honoured in his own country and among his colleagues, we look in vain for his name among the foreign associates of the Royal Astronomical Society. The kind of work on which he concentrated his attention does not appeal to a numerous class of astronomers, especially would it fail to collect the suffrages of amateurs. But those who read his numerous papers will admit the ability by which they are distinguished and the informing character of their contents. We extend a respectful sympathy to the institution that is bereft of his services, to his colleagues who lose an illustrious example, and to his pupils who are deprived of an able and encouraging teacher.

W. E. P.

NOTES.

An important step has been taken by the Colonial Office, in conjunction with the Imperial Institute, in giving expert assistance to a project of the British Cotton-Growing Association to start cotton growing on a large scale in southern Nigeria. A detailed examination is to be made of several promising districts in the Protectorate, in order to determine the suitability of the soil, climate, &c., for planting cotton, the most important of these districts being the Sobo plains near the coast, where the Ethiope and Jamieson Rivers enter the sea. Mr. W. G. Freeman, of the scientific staff of the Imperial Institute, formerly of the Department of Agriculture of the West Indies, has just left England under instructions from the Colonial Office to cooperate in this matter with Mr. P. Hitchens, the local forestry officer in southern Nigeria, whose services have been placed at the disposal of the British Cotton-Growing Association by the local Government. In the event of a favourable decision being arrived at, the Colonial Office intends to render every assistance to the British Cotton-Growing Association in organising the arrangements for cotton cultivation in southern Nigeria, which will be commenced this season, and on the results of these preliminary operations the extension of cotton cultivation in the Protectorate will depend.

After practically fifty years' connection with the Berlin Observatory, Prof. Förster proposes to retire from the directorship, to which he succeeded on the retirement of Encke. The knowledge that he can survey a long period of activity and of successful work, and that he carries with him the hearty appreciation of his colleagues, will be to him a source of satisfaction in his well merited retirement and leisure. The observatory that he leaves to his successor and the problems that engage attention now are different from those that he took over from Encke. It would be interesting to compare the present state of the observatory and its instrumental equipment with the condition in which Prof. Förster found them when he joined the staff. In those ancient days the work of the observatory was to some extent hampered by the preparation of the national ephemeris, which, under the title of "Encke's Astronomisches Jahrbuch," attained such well deserved consideration. Gradually the Rechen Institut has separated itself more and more from the observatory, until the name of the director is no longer connected with the publication. Further, though the instrumental equipment has been extended, and is no doubt now in a high state of efficiency, yet the new director will probably find that larger telescopes are necessary to enable the observatory to compete with other national observatories. One may look for considerable expansion in this direction under the guidance of an astronomer so well known as Dr. Hermann Struve, who, it is reported, will take up his residence in Berlin next October as the director of the observatory. His reputation, built mainly on his admirable work connected with Saturn's satellites, will have confirmed him in the importance and advantage of instruments possessed of great optical power.

A Revaccination Bill, promoted by the Imperial Vaccination League, has been introduced into the House of Commons by Sir John Batty Tuke, and is backed by Sir M. Foster, Sir J. Dorrington, Sir R. C. Jebb, Dr. Thompson, and Dr. Farquharson among others. The Bill provides for the revaccination of all children between the ages of twelve and thirteen, except those who may be exempted in the way prescribed by the Act of 1898, or on medical grounds. A manifesto in support of revaccination at school age has been circulated by the league, and has already received the signatures of a number of influential persons, including the Chief Rabbi, Lord Kelvin, Sir Frederick Pollock, headmasters of public schools, heads of colleges, &c. Mrs. Garrett Anderson, M.D., the honorary secretary of the league, in a letter to the *Times* solicits further signatures, to be addressed to 53 Berners Street, W., and headed "Manifesto in Support of Revaccination," and with the name, address, and style of the sender clearly written.

With regard to the article on the "Fish Hypothesis and the Transmission of Leprosy," that appeared in Nature of February 25, Dr. John Knott writes to point out that leprosy has disappeared from Ireland, though the condition of the people, especially on the west coast, has but little improved, and half decomposed fish is still freely eaten.

A committee has been formed with the object of obtaining subscriptions for a memorial to the late Prof. Nicol, in association with the University of Aberdeen, in which he taught for twenty-five years. The form the memorial should take has not been decided, but a suggestion has been made that if a memorial brass, similar to those erected to the memory of his predecessor and his successor, the late Profs. Macgillivray and Nicholson, were provided, and placed with them in the University of Aberdeen, the ornithologist, stratigraphist, and palæontologist who have brought honour to the university would be fittingly remembered in association with the scene and centre of their life work. The following are among the names of members of the committee:—Prof. J. W. Judd, C.B., F.R.S., Dr. J. Horne, F.R.S., Dr. B. W. Peach, F.R.S., Prof. Stephenson, Prof. Trail, F.R.S., and Prof. J. Arthur Thomson. The secretary and treasurer, to whom subscriptions should be sent, is Dr. W. Mackie, 13 North Street, Elgin.

The French Association for the Advancement of Science has decided, on the proposition of the president, M. Laisant, to endow a course of astronomical physics in connection with the faculty of science of the University of Paris. The professor is to be M. Pierre Puiseux, of the Paris Observatory.

We regret to see the announcement, in the *Daily Chronicle*, that M. F. A. Fouqué, the eminent French geologist and mineralogist, died in Paris on March 7 in his seventy-sixth year.

A telegram from Mayotta, one of the Comoro Islands, states that since February 25 a volcanic eruption has been in progress in Comoro. Lava is being thrown up from three craters, situated about 1000 yards distant from one another. It is reported that at Penzance and some of the neighbouring villages an earthquake shock was felt at 1 p.m. on March 3. A telegram received at New York states that an earthquake, more violent than any experienced in that city during the past thirty years, occurred at Lima, the capital of Peru, at 5.20 a.m. on March 4.

The death is announced of Dr. A. S. Murray, keeper of Greek and Roman antiquities in the British Museum. Dr. Murray was born near Arbroath, in Forfarshire, on January 8, 1841. He was educated at the Royal High School of Edinburgh and Edinburgh University, and was also for some time a student at the University of Berlin. In February, 1867, he was appointed assistant in the department of Greek and Roman antiquities in the British Museum, the then keeper of the department being Mr. (afterwards Sir Charles) Newton. When Newton retired from the keepership in the spring of 1886, Mr. Murray was appointed his successor. Among the unofficial works written by him were a "Manual of Mythology," a "History of Greek Sculpture," a "Handbook of Greek Archæology," and "Sculptures of the Parthenon." Dr. Murray's scientific position was remarkable for the fact that, almost alone among modern archæologists, he refused to accept the evidences for the early dates that are now assigned to the Mycenæan period of Greek antiquity. Dr. Murray was a correspondant of the Institute of France, corresponding member of the Prussian Academy of Sciences, member of the British Academy, fellow of the Society of Antiquaries, and vice-president of the Hellenic Society.

The Trustees of the Elizabeth Thompson Science Fund made the following grants at a meeting held in Boston, Mass., on February 5:—300 dollars to Prof. Morris W. Travers, London, for researches on the absolute scale of temperature, by experiments with liquid hydrogen; 150 dollars to Prof. Benjamin L. Seawell, Warrensburg, Missouri, for study of the taxonomy and ecology of the organisms of fresh-water lakes, in relation to fish foods and water supplies; 40 dollars to Prof. A. Nicolas, Nancy, France, for studies on the embryology of reptiles; 250 dollars to Prof. H. S. Grindley, Urbana, Ill., for the separation and purification of the nitrogenous substances of meats; 200 dollars to Prof. R. Hürthle, Breslau, Germany, to determine the relation between pressure and the obliteration of circulation; 143 dollars to Prof. W. J. Moenkhaus, Bloomington, Ind., for studies on the individuality of maternal and paternal chromatin in hybrids; 50 dollars to Mr. S. P. Fergusson, Hyde Park, Mass., to measure the errors of absorption hygrometers; 300 dollars to Dr. Werner Rosenthal, Erlangen, Germany, for researches on the Lombardy chicken pest; and 300 dollars to Prof. Henry S. Carhart, Ann Arbor, Michigan, for the preparation and study of Clark and Weston standard cells.

The twenty-sixth annual general meeting of the Institute of Chemistry was held on March 1, Mr. David Howard, president, being in the chair. Prof. Tilden moved the adoption of the annual report of the council, at the same time commenting on the general progress of the institute. He considered it satisfactory to note that, notwithstanding the increasingly stringent regulations as to training, the very high standard of the examinations, and in spite of the loss of members by death, the number of fellows and associates, viz. 1098, was 251 higher than in 1894. He also referred to the scheme for the promotion of the better training of technical chemists, now under the consideration of the council. The president delivered his address, in which he commented on the work of the council during the past year, on the present position of the institute, and on the work the council at present has in hand.

It is reported by the *Scientific American* that the U.S. Navy Department will establish a branch naval observatory in Samoa, and that 1600*l.* has been allotted for this purpose.

The *British Medical Journal* announces that a congress of experimental psychology is to be held at Giessen on April 18–20. Among the organisers of the congress are Profs. Exner (Vienna), Hering (Leipzig), von Kries (Freiburg), Stumpf (Berlin), and Ziehen (Halle).

On Tuesday next, March 15, Dr. E. A. Wallis Budge will deliver the first of two lectures at the Royal Institution on "The Doctrine of Heaven and Hell in Ancient Egypt and the Books of the Underworld." The Friday evening discourse on March 25 will be delivered by Prof. Dewar on "Liquid Hydrogen Calorimetry."

At the thanksgiving service at St. Paul's Cathedral for the centenary of the British and Foreign Bible Society on March 6, the Archbishop of Canterbury referred in his sermon to the relation of science and religion. His Grace said, "It was on the strength of Biblical texts that the scheme of Christopher Columbus was condemned by the Spanish junta in 1490 as vain and indefensible. In 1616 Galileo's teaching that the earth moves round the sun was formally censured by the consulting theologians of the holy office, 'because expressly contrary to Holy Scripture.' A generation or two afterwards English students were warned by high authority against the investigations of so true and profound a Christian thinker as Sir Isaac Newton as being built on fallible phenomena and advanced by many arbitrary presumptions against evident testimonies of Scripture.' And the lives of Roger Bacon, of Copernicus, of Kepler, and of many more, down even to our own day, and incidents fresh in the recollection of many here, suggest to the thoughtful student of Holy Scripture the imperative need of a reverent and humble-minded caution in our attitude towards every controversy of the kind. We have been oftentimes reminded that it is only the foundation of God that remaineth sure, and on that foundation have been built also the irrefragable conclusions of science. We are not, indeed, required to accept at once every unproven hypothesis, or to mistake for absolute science mere assertions about that which is unknowable. True science and true religion are twin sisters, each studying her own sacred Book of God, and nothing but disaster can arise from the petulant scorn of the one, or from the timidity or the tyrannies of the other."

The view of an empire as an organism, presented by Sir John Cockburn in a paper on the biology of federation read before the Society of Arts on February 9, shows that scientific principles may with advantage be borne in mind in the consideration of problems in politics and practical sociology. There is a suggestive analogy between biological development and the life processes of political organisations and institutions. Comte thought that a study of the laws of biology was necessary for the proper comprehension of sociology; Herbert Spencer elaborated the numerous points of agreement between the two sciences, and Sir Leslie Stephen referred to the community as a social tissue. Primitive societies may be regarded as analogous to the simple cell; they are full of vitality, but fall an easy prey to more complex and effective organisations. When an offshoot takes place, the daughter organism completely separates itself from the mother, and there is no coordination between the two bodies. On the other hand, remarked Sir John Cockburn, in the many-celled entities the various groups of differentiated, but not wholly detached, cells undertake different duties, enter into definite relations, and become regularly coordinated in the performance of the functions necessary for the common life. The process of evolution is the same, whether it deals with the primordial cell, which by subdivision forms the various tissues and organs which, grouped together, constitute a complex organism, or whether it deals with a primitive homogeneous society, which by division of labour and coordination of effort becomes a civilised community, and by combination with other communities a nation; or whether, on the highest plane of all, it deals with a race which, by colonisation and subsequent cooperation of its several parts, becomes an empire. Sir John Cockburn's paper contains many other instructive instances of natural law in the political world, and provides a strong case for the cultivation of the scientific spirit in all who are concerned with the progress of the State.

In the February number of the *American Journal of Science* Messrs. Bumstead and Wheeler give the results of an investigation of the radio-active gas found in the soil and in the tap-water at Newhaven, Conn. They establish its identity with the radium emanation by a careful comparison of the rate of decay of its activity and of its rate of diffusion. Mr. E. P. Adams has recently shown that the radio-active gas discovered by Prof. J. J. Thomson has the general characteristics of the radium emanation, and it seems likely that the gas obtained from the soil in various parts of Germany by Messrs. Elster and Geitel owes its activity to the same source. The authors conclude that radium is probably widely diffused in the earth's crust. They were unable to confirm the existence of a radio-active gas obtainable from mercury.

In the *American Journal of Science* Dr. C. Barus describes a direct micrometric method for the measurement of the diameter of fog particles. A thin plate of glass is covered with a film of oil and held for a certain time horizontally in the fog, and then rotated back into the field of the microscope, where it is screened from further deposition. The particles caught on the oiled surface appear as brilliant round globules, and persist in a saturated atmosphere for many minutes. Some preliminary results of the number of particles per cubic centimetre and of their diameter are given. The former varies from 4×10^4 to $2\ 5\times10^5$, and the latter from 4×10^{-4} to 8×10^{-4} cm. In certain cases the diameters of the drops varied between 10^{-3} and 5×10^{-4} cm., all the intermediate sizes being present. The experiments are being proceeded with by means of a photographic method.

The chief differences observed between the salts of radium and those of actinium can be explained by means of the view that the emanation from actinium disappears in a few seconds, whilst that from radium decays to one-half in four days. In the *Comptes rendus* of February 15 M. Debierne describes a series of experiments made in order to determine the rate of decay of the emanation from actinium. When the ionisation produced by the emanation was used as a criterion of its activity, a uniform rate of decay was observed, the activity diminishing to one-half in 3·9 seconds. On the other hand, the power of exciting induced radio-activity was found to rise (apparently from zero) to a maximum value, but ultimately to decay according to the same logarithmic law as in the case of the ionisation to one-half in 3·9 seconds. The rate of decay of the excited activity was also measured, and the half-value was found to be reached in 40 minutes.

A REPRODUCTION, in the *Chemical News* of February 19, of Profs. Curie and Dewar's paper on the examination of a sample of gas occluded in radium bromide contains a number of important details not referred to in the French paper recently summarised in these columns. Thus, in the experiments at the Royal Institution in which radium bromide was heated in a quartz tube, the condensable gases are stated to have contained water, bromine, and carbon dioxide in addition to the emanation, whilst the spectrum observed after freezing out the nitrogen was that of hydrogen, and not of nitrogen as stated in the *Comptes rendus*; in such a tube, it is added, it would be impossible to find small amounts of helium by the spectroscope, seeing that a 10 per cent. helium-hydrogen mixture shows nothing but hydrogen. In reference to the subsequent appearance of the helium spectrum in the vacuous quartz tube, it is pointed out that "until the full spectroscopic examination by Deslandres is published no inference can be drawn as to whether or no the amount of helium has gone on increasing in the quartz tube (as it ought to do if it is a true product of the disintegration of radium), and no conclusion drawn as to the presence of other gases and their origin, whether new or old."

AN exceedingly interesting summary of the recent work of Profs. Elster and Geitel on the radio-activity of the air and the soil is contained in a recent number of the Geneva *Archives des Sciences*. In order to test whether the radio-activity of the air was inherent or induced from outside, a steel boiler of 23 cubic metres capacity was kept closed during six weeks, and an aluminium wire was then introduced and negatively charged to a potential of 2000 volts; no radio-activity was induced on the wire, and the air, isolated in this way from the rest of the atmosphere, was completely inactive. The radio-activity is attributed to an emanation produced by some radio-active substance in the soil which finds its way into the included air, and thence into the free atmosphere as well as into the water of mineral springs. An attempt was made to isolate the radio-active constituent of a specially active earth from the Italian Alps, and the results obtained were in accordance with the view that the soil contained a trace of radium; the hydrochloric acid extract yielded a barium sulphate precipitate about as active as potassium uranyl sulphate, and a platinum kathode immersed in the solution became permanently (?) radio-active. Further support of this view is found in the fact that the induced activity separated from the air decays at the same rate as that induced by radium salts.

WE have received the first part of the "Abhandlungen zur Didaktik und Philosophie der Naturwissenschaft," which are being issued as adjuncts to the *Zeitschrift für den physikalischen und chemischen Unterricht*. These are intended to be monographs in a more extended form on matters such as those considered in the *Zeitschrift*. The present number, by Herr E. Grimsehl, of Hamburg (who is one of the general editors), is on "Die elektrische Glühlampe im Dienste des physikalischen Unterrichts," and deals, so far as is possible in the sixty pages at disposal, with the numerous uses to which electric glow lamps can be put in physical demonstrations. Many of these uses are probably well known to most lecturers who have had experience in demonstrating to large audiences, but the beginner will be able to pick up a great number of hints from the descriptions given. The apparatus described can all be obtained from the firm of A. Krüss in Hamburg.

THE United States Weather Bureau has recently issued a memoir on the climatology of California, prepared under the direction of Prof. W. L. Moore by A. G. McAdie, professor of meteorology. The author points out that the climate of California is controlled by four great factors:—(1) the movements of the areas of high and low barometric pressure; (2) the prevailing drift of the atmosphere from west to east; (3) the proximity of the Pacific Ocean, with a mean annual temperature near the coast line of about 55°; and (4) the exceedingly diversified topography of the country for a distance of 200 miles from the coast inland. To illustrate these leading features, long series of observations at suitably chosen localities have been elaborately discussed in 260 large quarto pages, with 42 diagrams and charts, and furnish a very valuable contribution to meteorological knowledge. The remarkable pictures of fog billows obtained at the Observatory of Mount Tamalpais, and noticed in our columns some time ago, are reproduced in an interesting article on the fog of the district of San Francisco.

WE have received a copy of the second part of the *Psychological Bulletin*, which is devoted to the literary section of the *Psychological Review*. It includes the proceedings of the American Psychological and Philosophical Associations.

THE volume of the *Proceedings* of the Philadelphia Academy for the current year opens with the first part of a paper by Mr. H. Pilsbry on new Japanese molluscs, this instalment being devoted to gastropods. The number of species described is very large; unfortunately, one of the names—*Conus dormitor*—has long been preoccupied for the well-known shell from the Barton Eocene.

IN the *Proceedings* of the South African Philosophical Society, Mr. W. L. Distant describes a number of new South African Tingididæ and other Heteroptera. In a previous paper the author enumerated twenty-six species, distributed in twelve genera as non-Palæarctic species of the African mainland; the present list raises the number of species to forty, and of genera to twenty-one. It may be considered a pity that the author uses the generic name of a common tree, Ulmus, to designate a new genus of insects.

ACCORDING to its report, the efforts of the Society for the Protection of Birds were mainly devoted during 1903 to securing more effectual protection for the breeding-places and eggs of our rarer birds, to the extension of the competitions in connection with "Bird and Tree Day," and to further exposure of certain alleged frauds in regard to so-called artificial osprey plumes and the suppression of birds' plumage in millinery. The "watchers' fund," started in 1902, not having met with so much support as was expected, limited expenditure on the first item. It is suggested that the endeavour may be made to render both the sale and possession of skins and eggs of rare birds illegal, but this is surely far too drastic a measure to meet with public approval. Most or all of the so-called artificial "ospreys" were found to be real egret plumes.

AN excellent portrait of Prof. D. J. Cunningham appears in the report of the Royal Zoological Society of Ireland for the past year. His appointment to the chair of anatomy at Edinburgh has compelled Prof. Cunningham to retire from the office of president, which he has filled with such conspicuous success for the last seven years, and the society is deeply sensible of the loss it has thereby sustained. The new president is the Lord-Lieutenant, the Earl of Dudley. The purchasing power of the society has been somewhat crippled by two circumstances, namely, the large amount of damage done to the buildings in the gardens by the great storm of February, 1903, and by a falling off in the gate-money. On the other hand, the gifts of large and valuable animals have been unusually numerous, including a young elephant and a young leopard from the Duke and Duchess of Connaught, and a pair of young giraffes from Sir Reginald Wingate.

WE have received from the Smithsonian Institution a batch of papers published in the *Proceedings* of the U.S. Museum. Among these is one, by Mr. G. S. Miller, on bats collected in Cuba, which contains an interesting account of a visit to a bat-cave in the island. Two others, by Mr. H. C. Oberholser, are devoted respectively to the American wrens and great horned owls. In a fourth Messrs. Jordan and Snyder describe and figure two chimæras from Japanese waters, while in a fifth the former writer and Mr. E. C. Starks review the scorpænoid fishes of Japan. Special interest attaches to the account, by Mr. F. A. Lucas, of a new labyrinthodont and a new reptile from the Trias of Arizona, on account of the identification of the former, which is known by the central thoracic shield, with the European genus Metoposaurus (*olim Metopias*), and from the apparent affinity of the latter, which is known from a humerus, and is named Placerias, with the African Pariasaurus.

WE have to acknowledge the receipt of vol. ii. of the third series of the *Anales* of the Buenos Ayres Museum. Dr. Ameghino's article on "diprotodont" Tertiary mammals from Patagonia has already been noticed in our columns. Among the other contents, two articles by Dr. H. von Ihering, the one on "Cretaceous" molluscs and the other on Tertiary brachiopods of Patagonia, are of prime importance. In the former the author, after pointing out what he regards as serious errors in the determinations of previous observers, concludes that strata regarded as Pliocene are really Pleistocene, and others classed as Miocene are truly Pliocene, while the alleged Cretaceous beds are considered to be more probably Eocene. Further observations on the subject, in which it may be hoped that the age of the various mammaliferous horizons will be taken into consideration, are promised. As regards Tertiary brachiopods, the remarkable resemblance between the South American forms and those of New Zealand, coupled with the equally striking difference between the former and their Chilian representatives, justify the opinion that the South American continent was formerly prolonged towards the Antarctic, and for this prolongation the author has suggested the name Archinotis. This Archinotis extended from Patagonia to Kerguelen Island at a comparatively modern (Tertiary) epoch, but if it formed a connection with Africa it must have been quite separated from the Chilian side of South America.

OF the papers which appear in the second part of the last volume of the *Transactions* of the Royal Scottish Arboricultural Society, the description of the Atholl larch plantation by Mr. J. Booth is interesting both from the historical and scientific aspect, and the information concerning the Douglas fir plantation at Taymount refers to a tree of great value which is fairly well suited to our climate. The volume also contains a summary of the principal coniferous timbers which are imported into the country, written by Mr. A. D. Richardson, "Notes for Planters," by Mr. G. V. Macdonald, and other papers.

A COPY of the fourteenth annual report (1903) of the Missouri Botanical Garden has been received. A very fine illustration is given of the *Agave Toneliana,* and another even more interesting photograph figures *Amorphophallus Rivieri* in flower, which is represented growing from a corm in a saucer (Fig. 1). Mr. A. Rehder presents an exhaustive treatise of the genus Lonicera, supplemented with illustrations of new species. He adopts Linné's subdivision into two subgenera, Periclymenum and Chamæcerasus or Xylosteum, and sinks the subgenus Nintooa in the latter. Another interesting section of this subgenus is named Cœloxylosteum, because the free bracts occur concomitantly with a hollow pith in the branches. The increase in the number of species—the total exceeds 150—is due to the large number of specimens recently gathered in China and other parts of Central and East Asia.

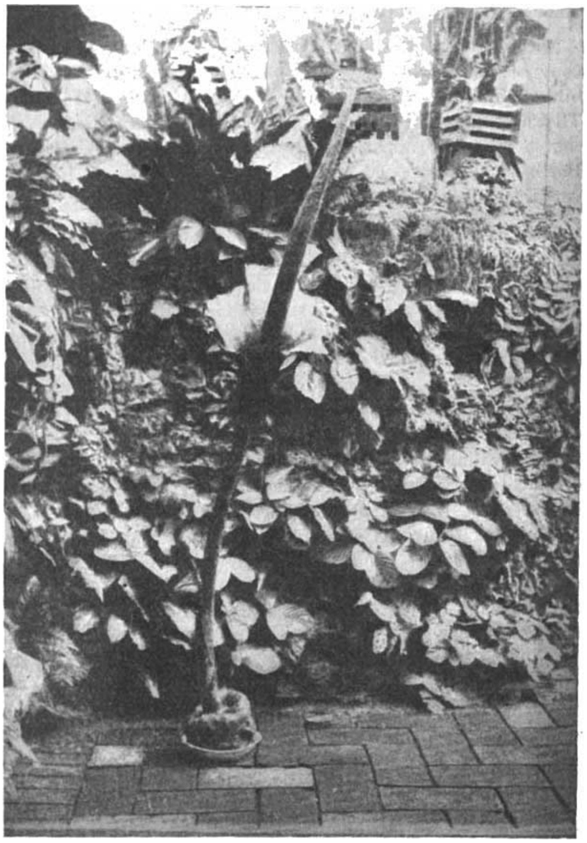

FIG. 1.—Saucer Gardening—*Amorphophallus Rivieri.*

PROF. BOVERI is always interesting when he writes on the cell, and the little volume—"Ergebnisse ü. d. Konstitution der chromatischen Substanz des Zellkerns"—just published by Gustav Fischer forms a useful presentation of the author's views as to the permanence of the nuclear chromosomes. Those familiar with the literature will perhaps not find much that is new, but the clearness with which the main thesis is kept before the reader considerably enhances the interest of what is mainly a summary of recent work contributed by the author and other investigators.

The report of the Felsted School Scientific Society for the years 1902 and 1903 shows that the masters at Felsted are encouraging scientific observation of biological and other natural phenomena. Papers by members of the society on the birds, butterflies, moths and plants of the school neighbourhood are printed in the report.

We have received from the Government of India Department of Revenue and Agriculture a copy of "Agricultural Statistics of India for the Years 1897–98 to 1901–02." The statistics were compiled under the supervision of the Director-General of Statistics, and are published in two parts. The first volume deals with British India and the second with the Native States.

Messrs. Leppin and Masche, of Berlin, have sent us a copy of the catalogue of the physical apparatus to be exhibited by them at the forthcoming St. Louis Exhibition. The first part of the catalogue contains particulars of a set of physical apparatus for the elementary schools in Berlin, and the second section instruments suitable for universities, high schools and colleges.

Some remarkable examples of positive and negative catalysis are given by Dr. Titoff in the *Zeitschrift für physikalische Chemie*. The case studied was the oxidation by dissolved oxygen of sodium sulphite in dilute aqueous solution, a change which was half completed in 10–20 minutes when the water used was distilled from a boiler with an iron still-head and so contained traces of iron, but required 200 minutes with water distilled in a silvered or tinned copper still, and as much as 1500 to 1800 minutes when the purest available water was used. The oxidation is extraordinarily sensitive to the influence of traces of copper, and it is stated that a marked acceleration is produced by N/1,000,000,000,000 $CuSO_4$, or by merely dipping a piece of bright metallic copper into the water during less than a minute. Mannitol even in N/100,000 solution *reduces* the velocity of oxidation by 50 per cent., and tin salts are even more powerful negative catalysts; at a concentration of only N/250,000 the velocity was reduced to 25 per cent. of the normal value, but even then the tin salt, though 150 times as active as the mannitol, is still 20 to 25 times less active than the copper salts.

The additions to the Zoological Society's Gardens during the past week include two Nisnas Monkeys (*Cercopithecus pyrrhonotus*) from Uganda, presented by Mr. C. R. Hall; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by the Lady Londesborough; two Cheetahs (*Cynaelurus jubatus*), a Beisa Antelope (*Oryx beisa*) from Somaliland, presented by Captain Barnard; a Horned Capuchin (*Cebus apella*) from South America, deposited; three Gold Pheasants (*Thaumalea picta*) from China, received in exchange.

OUR ASTRONOMICAL COLUMN.

Radial Velocities of Twenty Orion Stars.—Messrs. Frost and Adams, of the Yerkes Observatory, have just published the complete discussion and results of their determination of the radial velocities of twenty stars, all of which have spectra of the Orion type, in one of the *Decennial Publications* (viii.) of the Chicago University.

The spectra were obtained with the Bruce spectrograph attached to the 40-inch refractor, and a self-induction spark between titanium poles was used as the light source of the comparison spectrum in every case.

An analysis of the velocities obtained—which are reduced to the sun—indicates that the Orion stars, as a class, are much more remote than the solar stars, for their *real* radial velocities are much smaller. A classification of thirty-one Orion stars, based on the behaviour of the lines of He, H, Mg, Si, N and O in the region between λ 4300 and λ 4720, is given at the end of the paper.

Catalogue of Long-Period Variable Stars.—*Circular* No. 74 of the Harvard College Observatory contains a catalogue of 407 variable stars having long periods, published by Prof. Pickering. The positions and photographic magnitudes of some of the sequences of comparison stars for these variables were published in vol. xxxvii. of the Harvard College Observatory *Annals*; others will appear in vol. xlvii. Those sequences not given in either of the two publications mentioned are given in the present *Circular*.

Prof. Pickering expresses the hope that other astronomers will select and publish similar sequences for long-period variables, and that many will regularly observe these objects. He suggests that in using Argelander's method for determining the magnitudes it is quite sufficient to record that the star under observation is brighter than one and less bright than another of two nearly equal comparison stars, for, owing to the errors introduced by personal equations, &c., the estimation by grades is unnecessarily refined. All the comparison stars selected will, so far as possible, be observed photometrically at Harvard in order that the results from various observatories may be reduced to a common scale.

The Leonid Shower of 1903.—In the current number of the *Observatory* (No. 342) Mr. Denning gives a table of the apparent paths and magnitudes of twenty-six Leonids, six Taurids, and twenty-three other meteors, observed in England between November 14–18 inclusive, all of which were as bright as, or brighter than, Jupiter. In a second table he gives the real paths of nine of these meteors (including five Leonids, two Taurids, one Hydrid, and one Arietid), and then directs attention to the frequent appearance of bright Taurids and Arietids during the November Leonid showers.

M. Fiévez, of Boitsfort, in a communication to the Académie Royale de Belgique (*Bulletin* No. 12, 1903), announces that, during a watch of two hours (12.30 to 2.30) on the morning of November 16, he observed thirty-eight meteors, of which thirty-four were Leonids. In the same *Bulletin* M. Terby states that two other observers, also stationed at Boitsfort, observed thirty-four meteors, of which twenty-eight were Leonids, between 10.5 p.m. on November 15 and 5 a.m. on November 16. The majority of these were of the first magnitude, and they appeared in groups, six of them being seen in six minutes between 1 a.m. and 2 a.m.

The Distribution of Lines in Banded Spectra.—At a meeting of the Paris Academy of Sciences held on February 8, M. Deslandres announced the results of his recent researches in connection with the law, announced by him in 1886, concerning the distribution of lines in spectral bands. These results confirm his law of arithmetical progression, but indicate several anomalies in the behaviour of the independent lines in the series.

From a photograph of the negative-pole spectrum of nitrogen he very carefully determined the frequencies of the individual lines in the band at λ 3577, and found that they may be almost exactly represented by the integration of seven series, each obtained by calculation from the formula $N=A(m+p/q)^2+c$ (where N = the frequency, A and c are constants, m is a whole number, and p and q are small whole numbers), by giving different values to the constants for each series.

Finally, he states the general law, as now confirmed, in the following words:—"In general each band, expressed in number of vibrations, is divisible into series of connected lines, each series being such that the successive intervals are in arithmetical progression. . . ." (*Comptes rendus*, No. 6).